1983

The IcePerson Cometh: Cryonics, Law and Medicine

George P. Smith II
The Catholic University of America

THE ICEPERSON COMETH: CRYONICS, LAW AND MEDICINE

GEORGE P. SMITH, II, J.D., LL.M.

Abstract The "New Biology" has already made profound impact on the law. Cryonics and genetic engineering represent technological triumphs. The natural, organic process of dying is being replaced by a humanly engineered technological process for living. The dying phase of life is prolonged until biological knowledge is available to reverse the dying phase and restore the living phase.

Both cryonics and genetic engineering in their attempts to replace the organic process with the technological process disturb the delicate balance of the triad of life which each individual experiences—faith, health, and justice.

Since law is a basic tool to achieve justice among human beings, how should it respond to the health argument of the cryonics' physician who views death as a disease which is curable? How should the law respond to the faith questions surrounding the cryonics patient? What am I? A block of ice. Who am I? A living, comatose patient or a dormant, static body with the possibility of a reverter. Why am I? A new human being now endowed with immortality through the triumph of life over death founded on man's current faith in the God called Technology.

Cryonics through its unbalancing of the traditional triad of life poses formidable challenges to the major institutions of faith, health and justice. The practitioners in these institutions: clergy, physicians and lawyers must now reassess the rules of the game of life be they religious, medical or legal. This article offers insights to begin this reassessment.*

> ". . . the beginning of wisdom lies in the recognition that the body of law, at any time or place, is an unstable mass in precarious equilibrium."
>
> —G. Gilmore, *The Ages of American Law* 110 (1977).

For many, the inescapability of old age is becoming a reality.[1] The advancing years give positive proof of both a dreaded dilemma and a harsh reality.[2] Just as the ancient Greeks worshipped the physical nature of man and worried over the loss of beauty and strength that accompanies advancing age,[3] so—too—does modern man find himself repeating the same acts of worship.[4]

Vague feelings of despair often accompany the reflections upon youth and its brothers and sisters of old age and death. Yet, the truly rational person accepts the certainty of both with grace and equanimity and organizes with effectiveness his life, thereby undertaking those efforts needed in order to attain its goals.[5] Thus, what might be recognized as a total commitment to one's life goals comes from a full acceptance of death's inevitability.[6]

Cryobiology, or the study of low temperature biology, has been both the source and impetus for maintaining an abiding faith that death may be conquered.[7] The contributions of cryobiology to medicine are numerous: freeze-preservation of viable cell suspensions, blood serum and micro-organisms, semen and nonviable tissues used for transplantation; cryosurgery; advanced research into the freeze-preservation of large mammalian organs, and a plethora of other exciting uses.[8] Although experimentation and success in transplantation of human organs proceeds with definite success,[9] the total cryonic suspension of an entire body and its revival remains speculative.[10] The industrial uses of refrigeration—termed industrial cryogenics—have been equally significant.[11]

Efforts to forestall death's inevitability and thereby guarantee immortality have been dramatized on television,[12] through the motion picture media,[13] in literature[14] popularized by contemporary personalities,[15] and widely circulated publications.[16]

This study addresses the question of whether law should develop its basic postulates and the basic legislative justifications from science,[17] or should be responsive in a non-anticipatory manner to it.[18] Presently, the law of cryonics is undeveloped. In addition to the very economics of extended longevity, grappling with emerging principles which will shape the direction and chart the emphasis of this body of law is mired in serious scientific and biological obstacles, as well as complex ancillary issues whose bases are found in economics, anthropology, religion and philosophy. This present investigation can be viewed as a study of one paradigm of the "New Biology"—the cryonics movement.[19] Emphasis will be placed on an analysis of the scientific proofs, philosophical underpinnings and legal tenets which both validate and support the need for development of strategies to meet this challenge of the "Brave New World" and thereby assure that the law has an opportunity to be placed in equilibrium.

THE ETIOLOGY OF CRYONIC SUSPENSION

The new branch of biomedical research which offers hope for extending life and solidifying various concepts of immortality is termed "reduced metabolism." A collective term for all of the various means of altering or decreasing the rate of the bi-

---

* Abstract written by Prof. Oliver C. Schroeder, Jr., Director: Law-Medicine Center, Case Western Reserve University School of Law.

The author wishes to gratefully acknowledge the financial assistance that he received from The Commonwealth Fund and The Rockefeller Foundation together with the research facilities made available to him at The Kennedy Institute of Ethics, Georgetown University.

The author is Professor of Law, Catholic University of America, Washington, D.C.

ological processes in cells, organs and whole animals, reduced metabolism investigates not only the acts of hibernating animals who reduce their temperatures and metabolism sometimes to only three or four degrees above freezing, but the clinical use of hypothermia, or a process of subjecting the body to a cold environment in order to lower its temperature.[20]

The writings of Hippocrates discuss the control of hemorrhage by use of local cold and, during the Napoleonic Wars, medical literature records successful instances of local hypothermia to ease and deaden pain when amputations were performed.[21] Hypothermia procedures were refined after World War II by a French scientist, Dr. Henri Laborit, and used extensively for the treatment of shock.[22] In 1946 the French biologist, Dr. Jean Rostand, successfully preserved frog sperm in a partly frozen solution, followed in 1948 by the work of an English scientist, Dr. Audrey U. Smith, who preserved fowl sperm at low temperatures and used it subsequently for fertilization.[23] Modern scientists concluded that the suspended animation of individual cells was not possible.[24] Whether an entire state of human suspended animation will be achieved is viewed as speculative by many.[25]

In the 1950s, biologists working with low temperatures designed the term, "cryobiology," to describe those biological investigations which were conducted well below normal body temperature.[26] Cryogenics refers broadly to the technology of low-temperature experiments, while cryonics pertains to all disciplines and programs centered on human cold-storage.[27] Before the 1950s, in 1663, an English scientist, Henry Power, composed a mixture of ice and salt and immersed a jar of eels in it—thereby freezing them. After one night they were revived and the phenomenon known as "suspended animation" was originated.[28] The late 1950s witnessed the most significant breakthrough in hypothermia with the development of the heart-lung machine which allowed chest cavity surgery by allowing blood to be removed from the body to a heart-lung machine and then pumped through a hypothermia unit in order to cool it before returning it to the body.[29]

The United States Navy Tissue Bank was founded in 1950 and began a massive effort designed to freeze-dry human tissues for clinical use.[30] Freeze-dried bone and bone marrow,[31] nerve grafts,[32] corneas,[33] kidneys,[34] and red blood cells,[35] have been successfully used in transplantations.

As more malfunctioning parts of a human body become subject to replacement, the procurement and preservation of new organs becomes of central importance.[36] The molecular bases of freezing damage are not fully understood. Some whole organs subjected to freezing below a certain temperature have been found to be nonfunctional within a short time or immediately after thawing.[37] This suggests that a successful freezing and restorative organ program requires mastery of more than the mere ability to successfully freeze the component cells.[38]

There is a growing need to develop a set of uniform standards for various aspects of tissue-banking and transplantations. These standards would seek to assure that particular organs donated and received are free from transmissible infectious agents or were not obtained under questionable (e.g., black market) circumstances.[39] There is a realization by the Bureau of Biologics, the agency of the Food and Drug Administration responsible for regulating biologic products, that standards or regulations which are too inflexible in their application may well become not only impediments to "product" development, but in turn to health care and maintenance itself.[40]

The first freezing or cryonic suspension of a human took place for a Dr. Harold Greene after his death on January 12, 1967; the whole process of perfusing Dr. Greene took four hours.[41] The greatest danger for Dr. Greene, as for any person undergoing cryonic suspension, is the need to provide as much expeditious care as possible to protect the brain and the cells. The brain remains intact from three to five minutes, at normal body temperatures, after death. With decreases in the body temperature, the brain can remain without oxygen for an even longer period of time down to $-196°$ centigrade. It is at this degree of temperature that all change virtually stabilizes and the body may, for an indefinite time, remain in a near perfect state of preservation.[42]

Because the human body is composed of seventy-five percent of its weight in water, and water expands when frozen, the body cells would—if left unprotected—burst upon freezing. Therefore perfusion is the method of choice for internment rather than embalming for a successful cryonic suspension. Prevention of ice crystals inside the body cells is the basic purpose of perfusion. A protective chemical, glycerol, is combined with dimethyl sulfoxide (DMSO) which serves as a penetrant in carrying the glycerol to the cells through the bloodstream. Consequently, an absorption rate of ninety percent of the cells' water is achieved. This combination assures that the formation of ice crystals will occur not inside the cell, but outside.[43] Since perfusates with a high percentage of glycerol or DMSO are acknowledged to be toxic to the cells, other chemicals must be used in the perfusion process.[44]

THE CRYONICS MOVEMENT

If the message of life is to live truthfully and thereby accept the fact that life ends at some point for everyone,[45] the cryogenic movement smacks of absurdity and whimsy. If there is the remotest chance

of succeeding, should not the effort be undertaken then, in the name of scientific inquiry alone, to explore those chances? Unlike DNA experimentation, no real or substantial harm inures to society as a consequence of research and experimentation in cryonic suspension. Shattered individual *hopes* are the only fatality in cases of this nature. The power and magnitude of scientific thought and discovery can never be underestimated.

It has been speculated that the desire for future life is owing to a perception that most lives are—for one reason or other—incomplete and from a desire to renew friendships which have ended prematurely.[46] While the motivation of the cryonics movement may well be acknowledged to be an unconscious desire for immortality, the movement cannot be separated totally from a sustained effort by society as a whole over recent years to prolong life.[47]

For the modern immortalist, the pathway to his goal begins in a freezer. After death, cryonic suspension is administered, and the body is frozen and stored at either the temperature of liquid nitrogen or liquid helium until medical scientific advances are such that the incurable illness that brought about death has been conquered and new life may be assumed. Thereupon, the cryonically suspended individual is taken from his container/coffin, thawed, revived, repaired and given new life.[48]

It has been noted that, "doubt concerning one's future after death, represents a state of mind which is practically unbearable for anybody."[49] The philosophy of the immortalist rejects all notions that accept death as an unavoidable human condition and declares, instead, that death is conquerable.[50] The Permanent Revolution Against Death—which actively began with Socrates—will have succeeded once a cryonically suspended individual is revived and rehabilitated.[51] The work of the "Revolution" will be complete when unavoidable damage done to cells and tissues while the body is in suspension is repaired by methods now unknown, successful techniques for thawing have been established, remedies for the terminal illness or deteriorative effects which ended a cryonic patient's life have been discovered, and efforts to arrest, stabilize or reverse the aging process have met with success.[52]

In 1965, the first cryonic society was established in New York, and in 1966, a Life Extension Society Conference was held in Washington, D. C. The impetus for this activity was the publication of Robert Ettinger's book, *The Prospect of Immortality* in 1964.[53]

The Cryonics Association, formerly the Cryonics Society of Michigan, Inc., headed by Robert C. W. Ettinger, universally regarded as the father of the Cryonics Movement, has been in the vanguard of efforts to study and promote interest in life extension, gerontology, aging research, cryonics, futurism, death and dying since the early 1970s.[54] In 1977, twelve organizations were disseminating information concerning multiple aspects of life extension philosophies and the very promotion of cryonic suspension.[55] In 1979, four additional organizations were listed as being concerned with the advancement of cryonics and the elimination of death.[56]

The "Action Program" of the Cryonics Association/Cryonics Institute of Oak Park, Michigan, is illustrative of work undertaken by most organizations. Four goals are promoted: education, research, organization and action. These organizations seek to learn more about cryonics, and to disseminate that knowledge to the general public—especially physicians, morticians, clergymen, scientists, lawyers and insurance executives. They support research in cryobiology and in the development of improved freezing techniques—seeking not only to increase their sphere of influence by attracting new members, but by strengthening their financial resources and by assisting their members in making the necessary legal and financial arrangements for subsequent cryonic suspension.[57]

The typical member of the cryonics movement has an interesting profile. Membership in cryonic societies tends to be composed of white males in their thirties, who are non-religious and politically unconventional.[58] The total reported world membership of all cryonic societies is one hundred and fifty-five.[59] Since participating individuals placed a total reliance upon faith in technology as a source of power to engineer the continued existence of the physical body, cryonics groups have been termed neo-religious in their focus.[60] Thirty-five percent of the members of cryonic groups studied belonged to the Democratic or Republic two-party systems, while forty-eight percent of the members indicated either no political interest or affiliation.[61] The large majority of immortalists are of above average education and come from lower to middle socio-economic backgrounds.[62] Most of the members of cryonic societies are married,[63] and hold their membership for five years.[64]

A significant number of cryonics members fly their own planes and have built home bomb shelters.[65] In one study, seventy-two percent of those members polled expressed their reason for joining was to have a chance to live forever,[66] and eighty-two percent stated they fully expected to return from cryonic suspension to find an improved and better society,[67] with sixty-nine percent expressing the conviction that they would be reanimated within one hundred years.[68] It has been reported that twenty-four cryonic suspensions are complete, but only nine actual cases have been verified.[69]

Cryonics appeals to humanists, Christians and Jews alike. Indeed, since both Christianity and Judaism are "life-affirming" religions, the initial clerical reaction to the movement as a whole has been of a friendly nature[70] with encouragement from

some clergy for more serious work to be undertaken in the field.[71] The fundamental teaching and acknowledgment of the Christian faith that the "resurrection of the body" and eternal life are the ultimate hope and salvation is not thought to be in conflict with the cryonics movement. Freezing or suspension is not considered to be a scientific resurrection without an ultimate day of judgment. It is viewed as an extension of life. And extensions of life would enable individuals to more easily follow the ethical and moral codes of their faiths.[72]

Pope John Paul II recently cautioned scientists about the limits and dangers of "The New Biology," and of hibernation and delayed death, to the psychic and functional integrity of the individual.[73] If death is not hastened as a result of a cryonic suspension, and the potential user of the process is "fully informed" of the process and gives his agreement to it—with full respect for the human body being maintained—it is fair to assume that no insurmountable religious obstacles would exist to a suspension.[74]

The cryonics movement does not appear to be growing. The movement's failure may be due to lack of a charismatic leader. To be classified as an active movement or force, there must be a leader possessed of considerable magnetism or charisma, a tangible track record of some success, and a shared philosophy. Robert Ettinger, the progenitor of the movement, is regarded as an "unassuming, middle-aged physician professor, an intellectual and idealist who is inspired rather than inspiring."[75] There is no recorded success of a cryonic suspension and revivification[76] and—for some—the very promise of immortality inextricably tied to the movement is "in actuality, a threat to one's peace of mind."[77] The escalating costs of preparing and sustaining the suspension process itself, precludes a strong enrollment in the ranks of the movement.[78] The growing absence of a skilled and professionally competent organization to maintain the suspension process is also of negative import to would-be cryonicists.[79]

Another obstacle to the movement's success is current public opinion against those who espouse a radical philosophy of self-interest.[80] Within the membership ranks of the cryonic societies can be found a pervasive lethargy. Membership in a group which offers little social activity or neglects to structure a rewards system for its members seeking to postpone all forms of individual and group gratification until death, obviously has a tremendous "current interest" obstacle to overcome in order to maintain contemporary vitality.[81] Until the time when the first cryonaut returns from his frozen habitat, no validity or efficacy will inure to what may be loosely termed the cryonics "movement."[82] Even beyond a successful revival, the cryonaut or cryon will face serious problems concerning social and economic adaption in a society where family and friends are dead, and the indicators of economic wealth have changed dramatically. Thus the personal problems that he faces become the problems of the whole movement itself.

The message of the cryonics movement should not be seen as a shallow, unsophisticated philosophy of hope bereft of an organized and rational form of operation, but rather the message should be viewed as a call to expand our sights and visions regarding gerontology and the aging process. Viewed within a context of this nature, the movement becomes less a group of frenzied immortalists and more a group of concerned and devoted individuals seeking to learn the message of death through active, healthful living.

Death Defined

In the past, the medical determination of death was a relatively simple matter—for the physicians would pronounce a person dead when his breathing had ceased and no heartbeat could be heard.[83] A never-ending fear of premature pronouncement of death has combined with advances in medicine to artificially maintain life. An equal degree of eagerness by some members of the medical profession to rush forward in transplanting organs from a "deceased" person into an ailing-yet-active-body has necessitated serious discussion (and, in some cases, action) in structuring new criteria for determining when human death occurs.[84]

Basically, there are two types of death: clinical and biological.[85] Clinical death precedes biological death and occurs with cessation of the heart and respiratory system, simultaneous dilation and fixation of the pupils and absence of tendon reflexes.[86] From a biological point of view, death occurs by gradual degrees. Thus, even after a recognition of clinical death, certain biological activities occur.[87]

Classically defined as the final, persistent cessation of vital bodily functions, circulation, respiration and brain activity, death is inextricably related—if not totally dependent—upon three "portals of death;" for each system is dependent upon the others for its survival.[88] Cessation of breathing and loss of heartbeat are still viewed by many as the crucial death signs.[89] Only when artificial means are utilized to sustain these two functions has it been recognized that newer criteria in determining death should be considered.[90] Owing to recent, startling advances in medical technology[91] and in the field of organ transplantation,[92] it is now recognized that death may occur when the brain ceases to function. This occurrence is termed "brain death."[93]

Some commentators have drawn attention to what they perceive as sharp distinctions between the legal and the medical definitions of death.[94] The specific biological phenomenon of death is treated by

the law generally as a medical question of fact determined by the "ordinary standards of medical practice" in each community, the laws of each state and the customs attaching thereto.[95] The Uniform Anatomical Gift Act, while establishing procedures for regulating donations of organs, acknowledges simply that the death of a donor will be determined by the donor's attending physician.[96] The Act itself does not, however, define death; rather, it appears to operate on the premise that the act of death will be determined in fact by those standards which are widely accepted and applied in the ordinary course of events.[97]

The scientific test or criteria utilized by physicians in determining the time of death are not regarded as infallible.[98] Among the standarized criteria are: irreversible cessation of spontaneous circulation and/or respiration, absence of reflex in the eyes' pupils, absence of brain activity and absence of response to nerve stimulations.[99] There is no unanimous medical agreement regarding the effectiveness of the isoelectric EEG as well as other neurologic criteria nor the circumstances under which they should be applied. In fact, most physicians consider the isoelectric EEG to be used only as a means of *confirming* the fact of death. A number of questions remain concerning the extent to which this criteria should be utilized. Further refinement and research are needed regarding the total, full criteria relating to diagnosing death.[100] New understandings might well result in either the development of new criteria or the re-tooling of those in present use. It would be unwise for a statutory definition of death to impose specific criteria for rendering a diagnosis of the time of death. All too often the motivating forces behind the drive to evolve a uniform or statutory definition of death have been groups of individuals wishing to ensure a constant source for human transplantations.[101]

Meeting in Australia in 1968, the World Medical Association put forth the argument against the use of a precise statutory definition of death by noting:

> "This definition (of the time of death) will be based on a clinical judgment supplemented if necessary by a number of diagnostic aids (of which the electroencephalograph is currently the most helpful). However, no single technical criterion is entirely satisfactory in the present state of medicine, nor can any one technologic procedure be substituted for the overall judgment of the physician."[102]

In 1981, The President's Commission for the Study of Ethical Problems in Medicine and Biomedical and Behavioral Research gave its unanimous approval, in drafting a Uniform Determination of Death Act, that death be redefined as an occurrence where:

> "(1) irreversible cessation of circulatory and respiratory functions or (2) irreversible cessation of all functions of the entire brain; including the brain stem . . . A determination of death must be made in accordance with accepted medical standards.[103]

None of the current movement in clarifying the legal and medical concepts of death is particularly heartening to either individuals presently in cryonic suspension or those anticipating its use. If one were "suspended" before death, the real issue becomes how the law should deal with this occurrence—especially from the standpoint of the disposition of a "decedent's" estate.

The circumstances of cryonic suspension make it inevitable that the procedure will run into conflicts with the established laws of property. Specifically, the indeterminate length of time in which the individual must remain in suspension, and the uncertainty as to the exact beneficiaries of the individual's estate at the time suspension begins, make the circumstances prime for a violation of the Rule Against Perpetuities.

The Rule Against Perpetuities concerns property interests which are subject to uncertain conditions precedent. Specifically, the Rule invalidates any grant of a property interest which is subject to uncertain future acts or events. The spirit of the Rule is to confine the vesting of contingent estates to a relatively short period of time after their creation. The Rule allows a period of twenty-one years in which a contingent event may occur, before the property interest is invalidated. The twenty-one year period begins tolling upon the death of the last specifically named beneficiary who was alive at the time the grant was made. The last specifically named beneficiary is referred to as the life in being.

In dealing with The Rule Against Perpetuities, four basic approaches have been applied on a limited basis. Under the first approach, termed "wait and see," the limitation is tested *not* in terms of what might well happen in the future, but rather what in fact happens. Thus, a gift is valid if vesting occurs within the twenty-one year period. Under the second approach, a court will endeavor to reform what was originally an invalid gift into one which would be considered valid approximating as close as possible what the grantor would have intended had it been known to him that the gift was ineffective. Under the third approach, a validation of an otherwise invalid gift to a class of beneficiaries would be effected by excluding from class membership those beneficiaries whose inclusion would result in the invalidity of the gift. And, finally under the fourth approach, the court invokes a statutory presumption which may or may not be conclusive, whether the suspended individual will be presumed to be dead or alive.

Since the cryogenic suspension and revivification process will most likely extend past twenty-one years, it is apparent that the Rule Against Perpetuities

will present a problem. However, the Rule will present a problem only if the suspended individual is viewed as legally dead or is presumed to be dead. For, if the individual is viewed as alive while in suspension, he would be the life in being, and consequently there would be no violation of the Rule. Indeed, the Rule applies only to dispositions of property to third parties, and is not applicable in situations where the property has a possibility of reverting back to the grantor in the event that a grant to a named beneficiary fails for some reason. This latter situation is referred to as a possibility of a reverter. When considering that a trust instrument may be drafted with relative ease so as to state the specific intentions of the grantor, a possibility of reverter to the grantor may be included within the trust instrument. This method of drafting the trust instrument would mitigate the apparent harshness of the Rule Against Perpetuities. For example, the trust instrument could be drafted in a manner that the named beneficiaries would be persons presently alive—and the alternative beneficiaries would be their heirs in the event that the named beneficiaries had passed away. Thus, the trust instrument should specify that that the grantor intends to retain a possibility of reverter to take effect at the time he is revived from suspension. In this manner, the trust instrument would not violate the Rule Against Perpetuities, while at the same time it would preserve the grantor's intentions.

A Case in Point

The legality—assumed or otherwise— of cryonic suspension can best be seen and analyzed by a discussion and analysis of various issues inherent to the process itself. If a suspension were undertaken before one had in fact been determined to be legally dead, a number of fascinating complications arise. What follows, then, is an exercise in creative lawyering and an investigation of these complications.[104]

In the mythical case of *In re Glover* heard before the United States Supreme Court, the problem presented to the Court involved was whether Ralph Glover had died; if he had, his four children by his first wife and two other children by his second wife (both wives have died previously) would basically inherit the entire estate. Yet, if he were declared not dead, the trustees of the Glover Foundation would continue to receive all corporate revenues of those enterprises forming the Foundation.

Mr. Glover, a sixty-two-year-old man, in total possession of his faculties, discovered that he had contracted an inoperable cancer of his pancreas, which had spread to his liver. He accordingly directed his physician to inject his body with the chemical, dimethylsulfoxide (DMSO) and then become artificially frozen. Mr. Glover's suspension had been supervised by a medical team acting upon instructions by Mr. Glover himself. He directed that he remain in "suspended animation" until the time of a cure for his cancer was discovered; thereupon he was to be thawed and restored to full life.

Acting on a suit maintained by Mr. Glover's chauffeur seeking a declaration that Glover was in fact dead and that his bequest of $1,000.00 should be paid to the plaintiff, the New York Surrogate Court indicted the team of physicians, who had supervised the suspension process, and they were subsequently found guilty of willfull homicide for their act of injecting a noxious drug into Mr. Glover's system.[105] The Glover Foundation objected to any probate consideration being advanced since they contended Glover was still alive. By a four-one decision, the New York Court of Appeals affirmed the lower court.

A relative (son-in-law) of Mr. Glover's sought, under the authority of a local ordinance requiring the performance of an autopsy on persons suspected of having died violent deaths, to have such an autopsy performed. A temporary injunction was granted, however, on behalf of Mr. Glover's son who challenged the right of the city to order the mutilation of a corpse—especially since it was questionable whether a corpse was available.

Other heirs of the Glover estate maintained an action for medical malpractice against the physicians who performed the suspension as well as the hospital where the procedure was effected. Although a significant award was won, it was being contested by the doctors' medical liability company on the grounds that the "heirs" had a recognizable right to sue for an adult who not only was alive, but—when revived and restored to consciousness—was himself capable of testifying whether in fact he had suffered an injury by that procedure undertaken by the physicians. The State's Attorney General also charged the two physicians in question with promoting "a vile and pernicious doctrine"—condemned domestically and abroad, especially in the Nuremberg trials—that terminally ill patients could not have their lives taken under the guise of mercifully ending their suffering states.

A number of members of the New York State Bar Association sought a vote of censure of the law firm which drew up the contract under which the surgical intervention of suspension was performed by the physicians for Mr. Glover on the grounds that the contract was "grossly immoral and fraudulent." They also sought a judicial opinion regarding whether the contract was fraudulent as to its statement. This tack was taken on the grounds that the contract implied human immortality and was, therefore, totally inconsistent with and contrary to the State Blasphemy Act passed in the early history of the state and never repealed. Thereupon, the Society for the Advancement of Atheism requested permission to present a brief *amicus curiae* showing

the Act was in contravention to the First Amendment to the Federal Constitution.

Various state tax commissions, where Mr. Glover owned property, sued for the distribution of the estate's assets arguing that recognition of the continued existence of Mr. Glover—alive or dead—would be an invasion, albeit a novel one, of the Mortmain laws since a corporation controlling real as well as personal property was preventing the states in question from receiving a reasonable payment of taxes due and owing. Creative federal bureaucrats sought to void the Glover Foundation's tax exempt status arguing that under present laws governing charitable trusts, no trust would be operating solely for the purpose of maintaining an individual's life.

The Glover Foundation thereupon sought the removal of the two physicians from their posts who both assisted and supervised in performing the cryonic suspension and were responsible for maintaining it. The trustees of the Foundation asserted the physicians in question had no legal right to act as Ralph Glover's agents—especially since they were now convicted felons. The original contract entered into by Ralph and the physicians and drawn by Glover's attorneys, to act for Ralph directed that they use the net profits of the Glover enterprises (which comprised the Foundation) to be given over to cancer research.

These two beleagured physicians, Drs. Green and Hankey, were intent on executing the contract into which they entered with Ralph Glover. Accordingly, they were suing to block a ruling given by the New York State Board of Health that—consistent with local ordinances—Ralph Glover be buried or cremated. The physicians unsuccessfully sought to have a declaratory judgment issued by the Food and Drug Adminstration that the drug, DMSO, was both harmless and incapable of causing death in the dosage used for Mr. Glover's suspension. This action was unsuccessful because the Food and Drug Administration, as a branch of the Executive, was unwilling to exercise its powers of intervention before the judicial branch of government had made a final determination.

A minor legatee sought and obtained an injunction against any actions designed to thaw or resuscitate Mr. Glover. Her position was that since she had vested interest in the estate, it was an unreasonable jeopardy of that interest to allow such an act until a final adjudication was made regarding the matter. One of Glover's daughters sought—to the chagrin of another sister and two of her brothers—to have a legal guardian appointed for her father since, she argued, in his present state he was either incapable or incompetent to manage his own affairs. The counter argument was a classic one: how could a dead man need a guardian?

All these various cases were consolidated. Among various *amici curiae* allowed to participate, the brief of the Society of Experimental Biologists and The American Cryologic Association were of considerable importance. The Society's position was that a judgment against the physicians would reverse advancing developments in organ transplantation simply because of a pervasive fear that would grip those physicians being called upon to assist in this important work. The Association put forward the argument that considering the freezing or cryonic suspension of living persons as murder would be an intolerable invasion or compromise of one's personal autonomy which allows one to act toward his body in any way so desired.

The Chief Justice ordered the appointment of a Special Master whose duty was to inspect Ralph Glover's body and determine whether it was alive or dead. The Master assembled a group of medical experts to assist him and their findings were: the electroencephalograms taken showed no brain waves of the type normally recorded for living persons; the electrocardiograms showed no evidence of heart muscle current—yet it was carefully noted that at low temperatures as that which Mr. Glover was being maintained, little if any electrical conductivity would be present; neither pulse, heartbeat or respiratory movements were observed—but these specific findings were of little weight because of previous studies which showed the difficulty of ascertaining when life departed when one's metabolism was close to zero; no oxygen level determination could be observed owing to the fact that the blood system was frozen; the state of the blood vessels as viewed by the eye grounds was also impossible since the lenses were clouded and a state of opacification of both the aqueous and vitreous humors was recorded; a condition which should have occured within a few hours after an actual death—namely, a total absence of lividity of dependent tissues—was not found to be present. To add further confusion and uncertainty to their findings, the Master and his team found a small section of skin which was taken from Mr. Glover for biopsy, when unfrozen and examined microscopically, to have a cloudy swelling of the cells which while a common sign of death, is also a condition which is present in "cachectic or wasting states" as those found in various forms of advanced cancer.

One conservative Associate Justice of the Court, who found it difficult to understand or accept new theories of processes, determined a writ of habeas corpus should issue. In this way, Mr. Glover would have to be unfrozen. And, should he be found alive after revival, "all the cases fall out." Yet, "if he's permanently dead—what an expression!—judgment will be easy in every case."[106] The most junior member of the Court cautioned against issuing the writ, noting its issuance was limited to those cases where a determination was to be made whether an inferior court, acting without jurisdiction or in excess of authority, improperly detained an individ-

ual. The Chief Justice, nevertheless, pressed his opinion that Mr. Glover be thawed—with the express purpose of such act being to discern his actual intention concerning the alleged contract with the physicians, Doctors Green and Hankey, who performed and maintained the cryonic suspension. It was speculated that since Glover wished the suspension to be maintained until a cure for the particular cancer which he had could be found, this was tantamount to establishing a trust in perpetuity and thus void.

Justice Freundlich opined that an order to thaw would be direct interference with the terms of the doctors' contract with Mr. Glover and that such action could be pursued only if the contract was either contrary to public policy or violated a specific statute. "Otherwise we are in effect condemning Glover to a real death—if he's not dead already."[107] An equally argumentative point was injected by yet another Associate Justice who observed that since the two physicians had already been found guilty of criminal homicide, to order the thawing of Mr. Glover would be a recognition of the fact that the corpus is, indeed, revivable and—thus—the physicians are not guilty of the crime of homicide. (The Justice continued by noting that if the Court "felt" Glover were alive, there was no need for the thaw order.) While being exonerated on charges of criminal homicide upon Mr. Glover's revival, the supervising physicians would be subject to suits for breach of contract and for damages which would be maintained by Mr. Glover and the Glover Foundation, respectively. "If the man is dead, they are incriminating themselves by their failure to resurrect him," observed the perspicacious, yet nevertheless contentious Justice.

The final disposition of this case was determined by an act of God; for several days after the Justices' Conference, New York City suffered a power outage with all electricity being suspended for some fourteen hours. As judicial "luck" would have it, the vault where Mr. Glover was being cryonically suspended (i.e., frozen) at the Glover Memorial Hospital apparently had no emergency sources of reserve power and—thus—all forms of animal life in the freezers "died." Fortunately for the Court, it was allowed to sidestep all the previous vexatious issues raised and simply hold, unanimously, "that Ralph Glover died by an act of God on an indeterminable date."[108] The previously consolidated cases were severed and returned to the lower courts for resolution.

Aggravations and Complications

While there are no property rights in a corpse, the Common Law has always recognized that every person is entitled to a decent "Christian burial."[109] "It is a right that accrues in one's lifetime—exercisable only after death."[110] In so far as possible, it remains the duty of the courts to enforce the expressed wish of one regarding his final place of rest.[111] The place of rest or cemetery may in turn be created without any actual internment by merely setting aside the necessary ground for purposes of burial.[112]

In 1977, a cemetery director in New York stated that at one time there were three cryogenically preserved in his cemetery: one corpse had been stored in a garage at the cemetery; one was subsequently shipped to California and one after some lapse in time, was buried in a regular manner.[113] A funeral director in New York stated that since 1969, he had performed seven cryonic suspensions and shipped them all to California.[114] These suspensions are regarded as legal entombments, and so long as they are regarded as presenting no health hazards to the community at large should not be subject to restrictive legislation.[115]

Currently, it is estimated that there are some thirty-four bodies cryonically interred in cryotoriums—most of them in California. Trans Time, a California corporation, which offers a full range of cryonic suspension services from planning to subsequent suspension, is holding nine bodies for what is believed to be ultimate revivification. One hundred individuals already have completed arrangements for their cryonic suspension upon death.[116]

Recent adverse publicity surrounding a jury award of $928,594.00 for breach of contract and fraud regarding a bankrupt cryotorium's failure to provide the continuous suspension of two individuals has perhaps all but doomed the future of the cryonics movement.[117] Yet, the President of Trans Time, Inc., in Berkeley, California—claiming to be the head of the only surviving cryonic suspension firm (with ten frozen cadavers to substantiate his claim)—stubbornly asserts that regardless of the recent judicial setback, cryonics has a "great future."[118]

Conclusions

Where law ends or remains uncharted, discretion becomes the construct for decision-making.[119] This, of course, does not necessarily presage negative results. Custom, usage, and equitable balancing tests become paramount; and the situation ethic is more directive than a structured *a priori* standard. Although law and the ethical standards which undergird its design and implementation may be regarded as evolutionary by some,[120] the law of the New Biology must be predictive. It must draw upon established precedents in order to resolve new conflicts. These precedents, and their modern application, will in turn be focused or tied to an equitable test which weighs or shapes the extent to which a decision will be made affecting a use or application of a biological or technological intervention by con-

sidering the gravity of the harm that will arise as a consequence of *not* using that process versus the utility of the economic, social, or philosophical good that will inure if applied. Thus, stability and predictability are sacrificed for fluidity and flexibility.

Pursuits—medical, legal, economic or otherwise—need not be justified by a motive of social well-being. "If we have satisfied ourselves that our pursuits are good for society, or at least not bad for it, I think that science—like art—may be pursued for the pleasure of the pursuit and of its fruits, as an end in itself."[121] If advances in science are viewed as consisting of progressive simplifications, it should follow that the stronger the hypothesis, "the more phenomena it will explain."[122] Similarly, the fewer formulae relied upon in order to explain whatever is the point of investigation, the better a situation is.[123] Stated otherwise, the stronger a society is, the less law there will be to regulate it.[124]

The "law" of cryonics will be drawn—as has been shown—from established precedents which will in turn both regulate and chart its course of development. Few insurmountable problems will arise for law, science and medicine if but a simple recognition is made of the actual state of cryogenic suspension. Legal mechanisms are already in place to deal effectively with the consequences of such action. The broad equitable decision-making powers of a court assure a measured approach to problem-solving here and forestall the need for vigorous and oftentimes misguided law-making.

For law, science, and medicine to be overcome by a state of lassitude and of ineptitude and thereby neither anticipate nor structure a response to the ramifications of the cryogenic suspension of humans would be a serious blunder of considerable dimension. Clearly, scientific actions which hold forth the promise—no matter how remote—of increasing the quality of purposeful living and minimizing suffering must be pursued.[125] The simple, yet at the same time complex, challenge of the "Brave New World of Tomorrow" is to be prepared. Responsible decision-making, then, becomes the touchstone for progress.[126]

FOOTNOTES AND REFERENCES

1. Older Americans Act of 1965, Pub. L. 89-73, 42 U.S.C. §101 1-10.

In addition to stressing the inherent dignity of the individual in a democratic society, one of the objectives of this legislation is to promote a "full and free enjoyment of knowledge which can sustain and improve health and happiness." Id. at §3001(g).

See generally, Spierer, H., *Major Transitions in the Human Life Cycle*: a summary of a conference on the Significance of the Biomedical and the Social Sciences in Understanding the Aging Process. New York: Academy for Educational Development, 1977; Loether, H. J., Problems of Aging: Sociological and Social Psychological Perspectives, Belmont, CA: Dickenson Pub. Co., 1967.

2. Blythe, R. "Living to be Old," *Harpers* 259: 36-54, (July, 1979); Schwartz, A.N., Peterson, J.A., *Introduction to Gerontology*, New York: Holt, Rinehart and Winston, 1979; Kart, C.S., Manard, B.M., *Aging in America: Readings in Social Gerontology*, Port Washington, NY: Alfred Pub. Co., 1976; *Toward a Theology of Aging: A Special Issue of Pastoral Psychology* (S. Hiltner, ed.), NY: Human Sciences Press, 1975.

3. Id. at 50.

4. Not only is classical and Victorian literature replete with both study and reference to the powerful and often thought-to-be hideous consequences of old age, but one finds the modernists such as Maugham and Hemingway—for example—also absorbed with the phenomena. Supra, generally note 1.

Tennyson has captured the plight and the beauty of the dreaded aging process in his poem, "Tithonus," the saga of a young man caught up in the transient, narcissitic beauty of his youth and the devastation that befalls him as his wish to immortality—without perpetual youthfulness—is granted by the goddess, Aurora.

5. Fried, "The Value of Life," 82 Harv. L. Rev. 1415, 1435 (1969).

6. Id.

7. *Current Trends in Cryobiology* (A. Smith, ed.), New York-London: Plenum Press, 1970; Meryman, H.T., "The Interpretation of Freezing of Biological Systems," *Science* 168:939-949, May 22, 1970.

8. Prehoda #1. Guttman, F.M., Khalessi, A., and Berdnikoff, G., "Whole Organ Preservation," *Cryobiology* 6: 339-346, January–February 1970; Mazur, Peter, "Cryobiology: The Freezing of Biological Systems." *Science* 168:939-949, May 22, 1970; Valeri, C.R., and Brodine, C.E., "Current Methods for Processing Frozen Red Cells," *Cryobiology* 5:129-135, September–October, 1968.

Cryotherapy—and more specifically the treatment of arthritis with the use of ice water—was recently recognized as an effective type of therapy. "Treatment for Arthritic Knees: Ice Water," *Wash. Post*, September 1, 1981, at A4, col. 2.

Human donated skin can be frozen at 30 degrees below zero for six months or more and used in transplants. "Washington Hospital Center's Skin Bank Looking for Donors," *Wash. Post*, September 25, 1971, at B7, col. 4.

9. E. Nizsalovszky, *A Legal Approach to Organ Transplantation and Some Other Extraordinary Medical Actions*. Budapest: Akadbemiai Kiadbo, 1974.

10. Dr. David Robinson, one of only about twenty or thirty cryobiologists concerned with this process, has termed the current study, speculation and investigation in cryonic suspension as "pure science fiction." *The Wash. Post Mag.*, October 8, 1978, at 5.

See generally, B. J. Luyet, *Life and Death at Low Temperatures*. Normandy, MO: Biodynamica, 1940.

11. Industrial cryogenics is a low temperature process extending the life of cutting, impact and wear tool and dies to 600%. Kohler, J.W.L., "The Stirling Refrigeration Cycle." *Scientific American* 212: 119-127, April 1965.

North American Philips Co., Inc. of Ashton, Rhode Island, has developed a cryogenerator—a versatile, compact single-storage machine that cools gases from room temperature to as low as −370° F.

12. The CBS network aired an episode of "Hawaii Five-O" on March 30, 1978, entitled, "Frozen Assets," involving efforts to revive a dead man who had been in cryonic suspension for six years.

NBC devoted a segment of its "Prime Time Saturday" program of March 15, 1980, to a report on cryonic suspension and noted that about 100 people had contracted to be frozen, upon death, for an initial cost of $12,000.00 and a current charge of $2,000.00 a year for maintenance therafter. Presently, at the Trans Time Corporation in Berkeley, California, some six bodies and three heads are preserved. The reporter for this program, Jack Perkins, observed that while cryonic suspension would not be feasible today, it might well be so within 100 years.

13. See notably Woody Allen's 1973 movie, "Sleeper," and Robert Altman's science fiction movie, "Quintet," made in 1979 starring Paul Newman.

14. See F. Pohl, *The Age of the Pussyfoot.* London: Victor Gollancz, 1970, where the principal character emerges from a "sleep freeze" in the year 2527 A.D. and faces the realities of the new world.

15. Salvador Dali announced publicly that, upon his death, he would be cryogenically suspended (i.e., frozen) in a vault. "Debelius, The Undying Dali," *Wash. Post,* January 2, 1980, at B1, col. 5.

16. In *The People's Almanac Presents the Book of Predictions,* New York: Morrow, 1980, it is predicted that in 1992, cryogenic preservation will be a recorded success, and the first person undergoing it will be resuscitated. A few years later, the authors go on to predict a large number of terminally ill or "hopelessly aged" patients will be frozen prior to death for re-animation after medical remedies for their various maladies are discovered. Id., at 162-163, 312.

See also the report from Fosston, Minnesota, of a 19-year-old woman, Jean Hilliard, who collapsed in 22 below zero weather and lay in the snow for six hours and survived—even though she was frozen too solid for intravenous feedings to be undertaken initially. Bakken, "After Slow Thaw, A Nearly Frozen Teen Recovers," *Wash. Post,* December 30, 1979, at A4, col. 3.

Eugene Tison was the initial beneficiary in 1977 of a radical new heart surgery that involved chilling Mr. Tison's body to 60 degree Fahrenheit and draining it of his entire blood supply while physicians at The Washington Hospital Center replaced a four inch piece of damaged artery with a dacron tube. Cooling the body to 60 degrees allows it "to live for an hour without blood, as major body organs nearly cease to function at that temperature, thus need little blood." Mr. Tison died subsequently of dissected arteries which are hereditary and for which no cure exists. *Wash. Post,* July 22, 1979, at B8, col. 1.

17. O. Holmes, *Collected Legal Papers* 138, 139 (1952 ed.).

18. Burger, "Reflections on Law and Experimental Medicine," 15 *U.C.L.A. L. Rev.* 436 (1968).

19. See Smith, "Manipulating the Genetic Code: Jurisprudential Conondrums," 64 *Geo. L.J.* 697 (1976).

20. R. Prehoda, *Suspended Animation: The Research Possibility that May Allow Man to Conquer the Limiting Chains of Time,* Philadelphia, Clifton Books Co., 1969.

The first American to "experiment" with reduced metabolism was Benjamin Franklin. In a letter dated April, 1773, he noted how some flies had been apparently drowned in a bottle of Madeira wine bottled in Virginia and sent to London. Upon arrival, when the bottle was opened, three drowned flies fell into the first glass that was poured and they thereupon returned to life shortly when the glass was placed in the sunlight. In fact, in less than three hours, two of the flies recovered by degrees and subsequently flew away, while the third one never recovered. Franklin opined that, upon death, he wished to be immersed in a cask of Madeira until recalled later to life by solar warmth. Id. at 4, 5.

Another interesting case—reported to the Swedish Academy of Sciences—involved an accident which occurred on March 23, 1756, in Sweden. On that date, a Swedish peasant fell asleep in snow after having attended a drinking party. The following day, friends found him frozen solid. They thereupon took him home and placed him in a coffin. Later, in the afternoon, a physician who was a friend of the family, decided no proper examination of the "dead" man had been performed. Although detecting no breath or heartbeat, the doctor detected warmth in the man's stomach pit. By applying heat to the chest and rubbing the man's arms and legs, he was revived. L. Kavaler, *Freezing Point: Cold as a Matter of Life and Death,* New York: John Day Co., 1970.

21. Prehoda, supra note p. 10.

22. Id. at 11.

It has been determined, modernly, that the alleviation of a number of distressing symptoms caused by malignant cancer can be maintained through cryosurgery; for freezing not only reduces the bulk of a tumor, but it also lessens drainage and odor, controls bleeding and relieves pain.

23. Prehoda, supra note p. 7.

24. Id.

See also, Klebanoff, G., and Phillips, J., "Temporary Suspensions of Animation Using Total Body Perfusion and Hypothermia: A Preliminary Report," *Cryobiology* 6: 121-125, September–October, 1969.

In experiments conducted in 1963, it was found that approximately 30% of a group of test animals (e.g., dogs) survived asanguineous total body perfusion for as long as thirty minutes. Klebanoff & Phillips, supra.

See Prehoda supra note p. 65.

25. Prehoda, supra note p. 9.

26. Id.

See also A. Harrington, *The Immortalist: An Approach to the Engineering of Man's Divinity,* New York: Random House, 1969; R. Ettinger, *Man Into Superman: The Startling Potential of Human Evolution—and How to be Part of It.* New York: St. Martin's Press, 1972.

27. R. Ettinger, *Man Into Superman: The Startling Potential of Human Evolution—and How to be Part of It.* New York: St. Martin's Press, 1972.

See E. Graham, *The Basic Dictionary of Science.* New York: MacMillan, 1966; *Butterworth's Medical Dictionary.* London: Butterworths, 1965.

28. Prehoda, supra note p. 73.

29. Id. at 13.

30. Friedlaender, G.E., Cahill, R.A., "Current Scope of the U.S. Navy Tissue Bank," *Transplantation Proceedings* 8: 21-24, June, 1976.

31. Perry, V.P., "Freeze-Drying for the Preservation of Human Tissues," *Transplantation Proceedings* 8: 189-193, June, 1976; Malinin, T., Pegg, D., Perry, V., and Brodine, C., "Long-Term Storage of Bone Marrow Cells at Liquid Nitrogen and Dry Ice Temperatures," *Cryobiology* 7: 65–69, July-August, 1970. Human and animal bone marrows have been stored successfully for six months.

32. Perry, supra.

See also MacKenzie, A.P., "Principles of Freeze-Drying," *Transplantation Proceedings* 8: 181-188, June, 1976.

33. Perry, supra note 31.

34. Filo, R.S., Bell, R.T., Small, A., Sell, K.W., "Current Status of Kidney Freeze Preservation," *Transplantation Proceedings,* 8: 215-221, June, 1976.

35. Valeri, C.R., and Brodine, C.E. "Current Methods for Processing Red Cells," *Cryobiology,* 5: 129-135, September–October, 1968.

See Meryman, H.T., "Observations on the Present State of Blood Preservation by Freezing," *Cryobiology* 5: 144-146, September–October, 1968.

36. Guttman, F.M., Khalessi, A., and Berdnikoff, G., "Whole Organ Preservation," *Cryobiology* 6: 339-346, January–February, 1970; Mazur, P., "Cryobiology: The Freezing of Biological Systems," *Science* 168: 939-949, May 22, 1970.

37. Mazur, supra p. 945, 946.

See also Greene, A.E., Athreya, B.H., Lehr, H.B., and Corell, L.L., "The Effect of Prolonged Storage of Cell Cultures in Dimethyl Sulfoxide and Glycerol Prior to Freezing," *Cryobiology* 6: 552-555, May–June, 1970.

38. Id.

39. Meyer, H.M., Jr., "Standards for Tissues Banks and Transplantation," *Transplantation Proceedings* 8: 253-255, June, 1976.

40. Id.

41. R. Nelson, *We Froze the First Man.* New York: Dell Pub. Co., 1968.

There appears to be some confusion regarding who can claim the distinction of being the first person to be suspended; for it is also reported that a retired psychology professor at Glendale City College, Dr. James H. Bedford, became the first such person in January, 1967. L. Kavaler, *Freezing Point: Cold as a Matter of Life and Death,* New York: John Day Co., 1970.

In 1976, it was stated that 24 bodies were in cryonic suspension. *Newsweek* 88:11, August 16, 1976.

42. Nelson, supra p. 48.

In order to prevent deterioration, once death occurs, the

candidate for cryonic suspension is taken to the coldest room in the immediate surroundings. The crucial step here is to maintain the dead person's circulation; for irreparable damage to the cells will occur if the circulatory system stops before completion of the freezing process. While some may have access to a closed-chest heart-lung machine, others must rely totally on artificial respiration and external heart massage. While either a heart pump or artificial respiration is being conducted, the body temperature is lowered by 50° F by means of ice packs and the perfusion process undertaken. Ideally, the procedure is best undertaken in a hospital setting with an attending physician or in the embalming room of a funeral home under the supervision of a licensed mortician. Once perfusion is completed, the body is placed in a box or container with liquid nitrogen and placed in a cryogenic warehouse, mausoleum or what has been termed a cryotorium. The main expense, then, becomes that of replacing the liquid nitrogen. Kavaler, L. *Freezing Point: Cold as a Matter of Life and Death*, New York: John Day Co., 1970.

43. Nelson, supra note p. 48.

44. Id.

Although no total uniformity exists regarding the procedure for freezing, a number of steps are normally taken in the process. They include:

1. Cooling the patient externally (usually with ice packs) while cardio-pulmonary resuscitation methods are administered immediately upon a determination of clinical death. The longer the delay in starting this process, the less chance the cryonic suspension will be effective. Heparin should be used as an anticoagulant, the noradrenalin to raise blood pressure, with penicillin to prevent an overgrowth of intestinal bacteria as well as sodium bicarbonate to offset acidosis or disodium glycerophosphate.

2. When the core body temperature reaches 10° C, perfusation of the body should be undertaken. Before this is commenced, however, the blood is removed from the body. The chief perfusate is based on glycerol. A solution of 5.5% glycerol by volume should be administered with successive increases in the concentration being made to 11%, 22% and finally 29.2%. Adequate time should then be allowed for equilibration or osmolality measurements. The other components (or cryoprotective agents) of the perfusate include: sodium chloride, 7.60 g/liter disodium glycerophosphate, 4.32 g/liter; dextrose, 0.50 g/liter; PVP K–30, 40.00 g/liter. An adjustment of pH of 7.4 with hydrochloric acid should be made. The base is U.S.P. water for injection. Heparin may also be needed.

In order to prevent lactic acid formation, the perfusate should be oxygenated by bubbling oxygen through for perhaps 15 minutes—using suitable gas dispersion tubes.

3. Using gas perfusion if possible, cooling should be undertaken by decrements thus allowing time for equilibration.

Long-term storage is at the temperature of liquid nitrogen, about −196° C or −320° F. *Cryonics Assoc./Cryonics Institute News Letter*. Updated, Unpaginated—on file in the Law Review Office.

A more detailed and graphic presentation of the process of preparing an individual for cryonic suspension is to be found in Nelson, supra note p. 135-156 (1968). See also, Kavaler, L., *Freezing Point: Cold as a Matter of Life and Death*, New York: John Day Co., 1970.

45. Huxley, J., "Science, Religion, and Human Nature," delivered at Conway Hall . . . on October 1, 1930, London: Watts & Co., 1930.

46. Haldane, J., "Daedalus: or, Science and the Future, A Paper Read to the Heretics," Cambridge, on February 4th, 1923, New York: E.P. Dutton & Company, 1924.

47. Letter from Dr. Norman Vincent Peale, June 13, 1977, a copy of which is on file in the Law Review Office.

48. Kavaler, Lucy, *Freezing Point: Cold as a Matter of Life and Death*, New York: John Day Co., 1970; Ettinger, R., *Man Into Superman: The Startling Potential of Human Evolution—and How to be Part of It*, New York: St. Martin's Press, 1972; Ettinger, R., *The Prospect of Immortality*, Garden City, NY: Doubleday, 1964; Tuccille, J., *Here Comes Immortality*, New York: Stein and Day, 1973.

49. Harrington, A., *The Immortalist: An Approach to the Engineering of Man's Divinity*, New York: Random House, 1969.

50. Id. at 20.

51. Id. at 61.

52. Id. at 241.

See also, Ettinger, R., *Man Into Superman: The Startling Potential of Human Evolution—and How to be a Part of It*, New York: St. Martin's Press, 1972.

53. Bryant, C. and Snizek, W., "The Iceman Cometh: The Cryonics Movement and Frozen Immortality," *Society* 11:56-61, November–December, 1973.

Several cryonic society groups were also formed in France. Segerberg, O., *The Immortality Factor*, New York: Dutton, 1974.

54. See Ettinger, R., *The Prospect of Immortality*, Garden City, NY: Doubleday, 1964; Bryant and Snizek, supra note 53 p. 56.

The address of The Association is: 24041 Stratford, Oak Park, Michigan 48237.

55. Trans Time, 1122 Spruce Street, Berkeley, California 94707, offers a full range of cryonic suspension services and a multipurpose facility where suspension can be carried out.

The Bay Area Cryonics Society, 7710 Huntridge Lane, Cupertion, California 95014, has a complete program for cryonic suspension, including financial and legal consultation and documentation and complete facilities for the induction and maintenance of suspension.

ALCOR, The Alcor Society for Solid State Hypothermia, Box 282, Verdergo City, California 91046, promotes an informational program designed to advance the quality and quantity of purposeful living.

MANRISE Corporation, Box 731, La Canada, California 91001, was formed in 1971 in order to develop special purpose apparatus for the cryonic preservation of humans. A rescue team is provided to take control in a cryonics emergency and carry out the freezing of an individual.

The Cryonics Society of South Florida, Box 693, North Miami, Florida, 33161.

Harman Help, Inc., Stuart, Iowa 50250.

Aging Prevention Research Foundation, Ltd., 216 Sea Cliff Avenue, Sea Cliff, New York 11579.

Committee for Elimination of Death, P.O. Box 696, San Marcos, California 92069.

Biofutures, 840 S.E. 22nd Avenue, Apartment 4B, Pompano Beach, Florida 33062.

Foundation for Infinite Survival, Inc. (no address).

Cyronics Society of San Diego, 4791 50th Street, San Diego, California 92115.

The Cryonics Institute, 24041 Stratford, Oak Park, Michigan 48237, a nonprofit co-operative formed by certain of the more active members of the Cryonics Association to build and maintain a storage facility in Northern Michigan. A one time membership fee of $1,000.00 is charged and credited to the account of the member for subsequent funding of individual suspension.

56. Cryonics Society of Australia, Box 18, O'Connor, ACT 2600, Australia.

Institute for Cryonics Education, 4352 Pickwick Circle #241, Huntington Beach, California 92649.

Institute for Advanced Biological Studies, c/o S. Bridge, 2021 Glenridge Drive, Indianapolis, Indiana 46218.

Life Extension Society, Inc., 1151 N.E. 1st Ave., Pompano Beach, Florida 33060.

57. *Cryonics Association/Cryonics Institute Newsletter*, Oak Park, Michigan, Undated, Unpaginated, on file in the Law Review Office.

58. Rievman, E., *The Cryonics Society: A Study of Variant Behavior Among Immortalists* ix, (1976). The most definitive study of the cryonics movement is to be found in Ms. Rievman's doctoral dissertation—a copy of which is on file in the Law Review Office.

Ms. Rievman's population in this study is drawn from several groups: the Cryonics Society of South Florida which, since its founding in 1972, has had between six to twenty active members: the one hundred fifty-five cryonic society members

throughout the world; nine presidents of cryonic societies throughout the world including those in Australia, Austria, France and the United States and the control group which was selected from undergraduates and graduate students at Florida Atlantic University, Palm Beach Junior College and Broward Community College and consisted of ninety-three subjects—eighty-six per cent of which were male, and ninety-nine per cent of which were white. Id. at 38, 39.

59. Id. at 39.

60. Id. at 4, 37, and 72.

See also Bryant and Snizek, supra note 53, pp. 56 and 59.

61. Supra note 58, p. 71.

62. Bryant and Snizek, supra note p. 59.

See also, supra note 58, p. 77 where Ms. Rievman records the mean educational attainment level of the subjects in her study as 16.58 years—which, of course, indicates some level of graduate education.

63. Rievman, E., The Cryonics Society: *A Study of Variant Behavior Among Immortalists* 74 (1976). Sixty per cent of the subjects in the study were married.

64. Id. at 69. The mean age was 39.2.

65. Bryant and Snizek, supra note p. 59.

66. Supra note 63, p. 108.

67. Id. at 113.

68. Id. at 80.

69. Id. at 97.

70. Ettinger, R., *Man into Superman: The Startling Potential of Human Evolution—and How to be Part of It*, New York: St. Martin's Press, 1972.

71. Harrington, A., *The Immortalist: An Approach to the Engineering of Man's Divinity*, New York: Random House, 1969.

72. Supra note 70, p. 215; Kavaler, L., *Freezing Point: Cold as a Matter of Life and Death*, New York: John Day Co., 1970.

73. "Pope Warns Against Misuse of New Medical Procedures," *Wash. Post*, Oct. 28, 1980, at A4, col. 3.

74. Letter from Vice Chancellor of Catholic Archdiocese of New York, Rev. Edwin F. O'Brien, June 16, 1977, a copy of which is on file in the Law Review Office. The Vice Chancellor acknowledged that whether the cryonics movement contributes to a true advancement of the human family is open to further analysis.

75. Kavaler, supra note 72, p. 258.

76. Bryant and Snizek, supra note, pp. 56, 60, 61.

77. Kavaler, supra note, p. 228.

See also, Spieler, "Freeze-Wait-Reanimate", *Religious Humanism*, 8:156, 1974.

78. In 1976 it was estimated that the cost of preparation and indefinite storage was approximately $50,000.00. *Newsweek*, Aug. 16, 1976 at 11. One can only guess what the cost would be today!

The New York Cryonic Society was, in 1976, charging $100.00 per month for liquid nitrogen for two people and $3,800.00 for the cryonic capsule plus $70.00 a month as a rental fee for the capsule's storage. The Cryonics Society of South Florida requires from each potential member, evidence of a $50,000.00 insurance policy, with the Society as the beneficiary. Rievman, E., *The Cryonics Society: A Study of Variant Behavior Among Immortalists*, 58, 59 (1976).

79. See *Time* Mag., June 22, 1981 at 77 where the report of a successful lawsuit was maintained against a cryonics interment association for negligence in allowing two suspended individuals to thaw.

80. Ettinger, R., *Man into Superman: The Startling Potential of Human Evolution—and How to be Part of It*, New York: St. Martin's Press, 1972.

81. Rievman, supra note, p. 92.

82. *Butterworth's Medical Dictionary*, London: Butterworths, 1965.

83. Winter, A., *The Moment of Death, A Symposium*, Springfield, IL: Thomas, 1969.

See generally, "Defining Death: A Report on the Medical, Legal, and Ethical Issues in the Determination of Death/President's Commission for the Study of Ethical Problems in Medicine and Biomedical and Behavioral Research," Washington, DC: The Commission, 1981. This Report is authored by the President's Commission for the study of Ethical Problems in Medicine and Biomedical and Behavioral Research.

84. Id.

See also, Capron & Kass, "A Statutory Definition of the Standards for Determining Human Death: An Appraisal and a Proposal," 121 *U. Pa. L. Rev.* 87 (1972).

85. Supra note 83, p. 20.

It has also been suggested that there is a third form or degree of death—cellular death. This death, which is not usually complete for at least a two-day period after clinical death, refers simply to irreversible degeneration or disorganization of individual body cells. Ettinger, "Lasting Indefinitely," in *Esquire* 64 (May, 1965).

Three additional forms of death have been suggested: apparent, relative and absolute. With apparent death, the outward appearances of such vital functions as respiration, circulation and motor activity have stopped. Relative death is not a bodily state between the cessation of cardiac and respiratory activity. Complete resuscitation is quite possible in the early stages of relative death. Finally, absolute death is defined as a condition where the resuscitation of a body as a whole or even the resumption of physiological functions of either individual organs or cells is impossible. Malinin, T., and Perry, V., "A Review of Tissue and Organ Viability, Assay," *Cryobiology* 4:104-112, November–December, 1967.

See generally, High, " Is 'Natural Death' an Illusion?," *Hastings Center Report* 37 (Aug. 1978).

86. Supra note 83, at 20.

87. Id.

88. Id. at 21.

89. Hendin, D., *Death as a Face of Life*, New York: Norton, 1973.

90. Id. at 19.

See generally, Lamb, "Diagnosing Death," *Philosophy & Pub. Affairs* 7:144, 1978; Veatch, K.M., *Death, Dying, and The Biological Revolution: Our Last Quest for Responsibility*, New Haven: Yale University Press, 1976.

91. Smith, "Manipulating the Genetic Code: Jurisprudential Conundrums," 64 *Geo. L.J.* 697 (1976); Smith, "The Medico-Legal Challenge of Preparing for a Brave Yet Somewhat Frightening New World," 5 *J. Leg. Med.* 9 (1977).

92. Dukeminier, J., and Sanders, D., "Organ Transplantation: A Proposal for Routine Salvaging of Cadaver Organs," *New England J. Med.*, pp. 413-418, Aug. 15, 1968; Dukeminier, J., "Supplying Organs for Transplantation," 68 *Mich. L. Rev.* 811 (1970); Robertson, "Organ Donations by Incompetents and the Substituted Judgment Doctrine," 76 *Colum. L. Rev.* 48 (1976).

93. *Brain Death: Interrelated Medical and Social Issues*, Korein, J., ed., New York, NY: Academy of Sciences, 1968; Harp, T., "Criteria for the Determination of Death," *Anesthesiology* 48:391–396, April 1974; Paulson, G., "Determination of Brain Death," *Ohio State Medical Journal* 68:39-41, January 1972; "Task Force on Death and Dying of the Institute of Society, Ethics, and Life Sciences, Refinements in Criteria for the Determination of Death," *J.A.M.A.* 221:48-53, July 3, 1972.

94. "Task Force on Death and Dying . . .," supra at 51, 52.

95. Id.

The various definitions of death which may be found among state laws serve specific purposes in deciding, for example, issues of inheritance and survivorship. Id. at 51.

Black's Law Dictionary defines death as the cessation of life; permanent cessation of all vital functions and signs. *Black's Law Dictionary*, 360 (Rev. 5th ed. 1979).

From a medical standpoint, death is defined as the permanent cessation of all functions. *Taber's Cyclopedic Medical Dictionary* 370 (14th ed., C. Thomas, ed. 1981).

For an interesting study of the dilemma of decision-making in this area, see generally, *In the Matter of Karen Quinlan*, 70 N.J. 10, 355 A.2d 647 (for an interesting study . . . area), *cert. denied, Garger v. N.J.*, 429 U.S. 922, (1976).

96. Sec. 7(b).

97. 8 U.L.A. 22 (Master ed. 1968).

See Capron & Kass, "A Statutory Definition of the Standards

for Determining Human Death: An Appraisal and a Proposal," 121 *U. Pa. L. Rev.* 87 (1972).

98. Jeddeloh, N.P., "The Uniform Anatomical Gift Act and a Statutory Definition of Death," *Transplantation Proceedings*, 8:245-249, June 1976.

A manifestation of rigor mortis and mottled discoloration of the body are also other tests to determine death. *Taber's Cyclopedic Medical Dictionary* at 371 (14th ed., C. Thomas, ed. 1981).

99. Id.

100. Id.

101. Id. at 248.

102. "International Comments, Declaration of Sydney: News Item," *J.A.M.A.* 206:657-658, October 14, 1968.

103. Minutes of Meeting XI of The President's Commission for the Study of Ethical Problems in Medical and Biomedical and Behavioral Research, July 9, 1981.

104. The following analysis is taken from Tushnet, L., In re Glover, in *Bio-Futures*: "Science Fiction Stories about Biological Metamorphosis," New York: Vintage Banks, 1976.

105. If cryonic suspension were to be recognized as an heroic measure designed to sustain life, then the concept of "mercy freezing" might have some legal validity and would thus be defined as "freezing a terminally ill patient before clinical death." Ettinger, R., *Man into Superman: The Startling Potential of Human Evolution—and How to be Part of It*, New York: St. Martin's Press, 1972. More likely, however, "mercy freezing" would be viewed both in law and medicine as mercy killings.

106. Id. at 51.

107. Id.

108. Id. at 53.

109. Jackson, P.E., *The Law of Cadavers and of Burial and Burial Places*, New York: Prentice-Hall, 1936.

110. Id.

111. Id. at 50.

112. Id. at 178.

113. See generally, Fellows, A., *The Law of Burial and Generally of the Disposal of the Dead*, London: Hadden, Best, 1952. Telephone Conversation with George Shencavitz, Director, Washington Park Cemetary, Coram, Long Island, New York, April 27, 1977. The interviewee noted that his cemetary no longer provides for cryonic suspension unless adequate financial provisions are made for the storage, upkeep and maintenance of the donor.

114. Telephone conversation with Frederick Horn, Director, St. James Funeral Home, Bayshore, Long Island, New York, April 27, 1977.

Interestingly, Mr. Horn observed that his charge for cryogenic preparation is $500.00—with welfare recipients being allowed $750.00 for funeral services and burial!

115. Supra notes 113 and 114.

One State Attorney General (in Wisconsin) rendered an opinion that in his state there was no statute, express or implied, which prohibited such cryonic interment.

116. *Newsweek*, July 7, 1980, at 9.

117. Id.

Time, June 22, 1981 at 71.

Cryonics Interment of California accepted varying amounts of money from $15,000.00–$31,294.00 from individuals who wished to assure cryonic suspension for relatives. Two plaintiffs, Dennis and Terry Harris, made a down payment in 1970 of $15,000.00 to the Cryonics Society of California in order to allow their mother and father opportunity to be "alive together in the future." When Cryonics Interment went bankrupt five years later, liquid nitrogen used to preserve the cadavers was stopped and thereupon they were thawed and became decomposed.

118. *Time*, supra.

119. See Davis, K.C., *Discretionary Justice: A Preliminary Inquiry*, Baton Rouge: Louisiana State University Press, 1969.

120. Burger, "Reflections on Law and Experimental Medicine," 15 *U.C.L.A. L. Rev.* 436, 441 (1968).

121. Holmes, O., "Law in Science and Science in Law," in Collected Legal Papers 210, 211 (1952 ed.).

122. Gilmore G., *The Ages of American Law* 43 (1977).

123. Id.

124. Id. at 111.

125. Smith, G., *Genetics, Ethics, and the Law*, 2, 10 (1981).

126. See generally, Smith, "The Promise of Abundant Life: Patenting a Magnificent Obsession," 8 *Utah J. of Contemporary Law* (1982).